

## REMARKS

### Amendments to the Claims

Upon entry of the present amendments, claims 24-27 and 29-33 are pending. Claim 24 has been amended to specify that the central body of the stencil is metallic. Support for this amendment is found, *e.g.*, at page 7, third paragraph. The present amendment does not introduce new matter.

Each of the grounds for rejection cited in the Office Action is addressed below, under an appropriate sub-heading.

### 35 U.S.C. §103(a)

Claims 24-27 and 29-33 have been rejected under 35 U.S.C. §103(a) as being unpatentable over GB 2,264,460 in view of US 2,073,379 (Rasmussen).

The claims, as amended, specify that the stencil includes a metallic body or metallic sheet through which receiving apertures are formed along each edge.

The metallic stencils described in the pending claims can be used for printing solder paste in a particular pattern onto a circuit board, as suggested in the opening paragraph of the specification.<sup>1</sup> The apertures along the four edges of the metal stencils enable tension to be applied substantially uniformly across the metal stencil along more than one axis without significantly stretching the metal stencil and avoiding or minimizing bowing of the stencil.<sup>2</sup> In fact, the substantially inelastic character of the metal stencil enables the metal stencil to be reliably used in printing solder paste onto circuit boards where the size, shape and position of the solder deposits must be carefully controlled via a fixed size, shape and position of the print apertures in the stencil.

GB 2,264,460 discloses a metallic stencil having receiving apertures along just two edges, while Rasmussen discloses a highly elastic rubber stencil having eyelets along four sides.

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<sup>1</sup> Present application (USSN 09/586,824), page 1, first paragraph (“The present invention is primarily concerned with means for applying solder paste to circuit boards . . .”).

<sup>2</sup> *See id.*, page 11, lines 3-6 (“Additionally, the springs maintain the stencil in tension and when in use and enable the provision of a strong even pressure and bowing of the sidewalls is avoided or minimized.”); Declaration of V. Van Velthoven, paragraphs 6 and 10.

Although Rasmussen discloses the provision of apertures along four edges of a highly elastic organic stencil, the elastic character of this stencil would render it unsuitable for printing applications, such as solder printing on printed circuit board (PCB) contact pads, where the size, shape and position of the apertures must be fixed and tightly controlled. Further, no suggestion or motivation is provided for exporting this teaching (*i.e.*, of providing apertures on more than two sides) from an elastic rubber stencil to a metallic stencil, as required in Applicant's amended claims.

The "highly elastic"<sup>3</sup> character of the Rasmussen stencil enables the aperture design to be "expanded or contracted . . . or elongated in one direction"<sup>4</sup> via application of tension through the apertures along the four edges to thereby stretch and expand the shape of the print produced with the stencil.<sup>5</sup> However, neither Rasmussen nor GB 2,264,460 in any way suggest that the metals that form the stencils described in GB 2,264,460 could be substituted for the rubber in Rasmussen's "highly elastic" stencil. To the contrary, GB 2,264,460, in describing a typical solder stencil, specifies that "a solder stencil or mask comprises a thin but still relatively *stiff* sheet of stainless steel or brass."<sup>6</sup> GB 2,264,460 further specifies that its stencil (unlike the Rasmussen stencil) is tensioned "without distortion."<sup>7</sup> Consequently, the motivation in Rasmussen of enabling the stencil to be stretched via tension applied to the apertures is not consistent with the described character of the metal stencil in GB 2,264,460 (*i.e.*, having a structure that is intended *not* to stretch).

Moreover, GB 2,264,460 teaches against providing apertures along all four edges of the stencil because it claims that the provision of two flexible edges with closely spaced apertures make it "possible to avoid the transmission of any tensioning distortions to the main body of the mask."<sup>8</sup> At the time, it was not realized that the sides of the stencil could nevertheless bow when

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<sup>3</sup> U.S. 2,073,379 (Rasmussen), Col. 2, lines 10-18 and 42-48.

<sup>4</sup> *Id.*, Col. 1, lines 1-11.

<sup>5</sup> Illustrations of stretched stencils are provided in FIGS. 5 and 6 (compare with FIG. 4) of U.S. 2,073,379.

<sup>6</sup> GB 2,264,460, page 1, 2nd paragraph (emphasis added).

<sup>7</sup> *Id.*, page 10, last line, and page 10, 2<sup>nd</sup> paragraph.

<sup>8</sup> *Id.*, page 13, 1st full paragraph.

tension was applied to only two sides. In contrast, “bowing of the side walls is avoided or minimized”<sup>9</sup> with the provision of the apertures along four edges as described in the pending claims.

Because the prior art does not teach or suggest the inclusion of such apertures (as characterized by number thereof or by shape and configuration) along more than two edges of a stencil where the stencil is formed of *metal*, Applicant respectfully submits that no motivation is apparent for combining the teachings relating to the highly elastic rubber stencil in Rasmussen with the teachings relating to the metal stencil in GB 2,264,460.

Moreover, additional evidence of the non-obviousness of the stencil described in the claims is found in the Declaration of Valentijn Van Velthoven, a copy of which is appended hereto,<sup>10</sup> which compares the claimed stencil with those described in the cited references and which discusses secondary considerations pertaining to non-obviousness, particularly (a) the commercial success of this stencil, (b) the long-felt need in the industry for a viable “frameless” stencil, (c) the failure of others to produce a “frameless” stencil that could compete strongly with the traditional “mesh-and-frame” stencil, and (d) copying by competitors of the four-sided frameless stencil after its introduction into the market, all of which serve as strong evidence that the invention was not obvious to those skilled in the art at the time the invention was made.<sup>11</sup>

As described in the Declaration, the PCB industry recognized a need for a “frameless” alternative to the traditional mesh-and-frame stencil, wherein stencil manufacturers attempted to produce “frameless” stencils that could favorably compete with the mesh-and-frame stencil after

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<sup>9</sup> Present application (USSN 09/586,824), page 11, lines 3-6.

<sup>10</sup> We have a faxed copy of the executed Declaration; however, the print quality of the fax is less than ideal. Accordingly, I have substituted original copies of pages 1-5 for the faxed pages. I affirm that the text of the substituted pages is identical to that of the executed Declaration.

<sup>11</sup> For commercial success as evidence of nonobviousness, *see, e.g., In re Tiffin*, 443 F.2d 394, 398, 170 U.S.P.Q. 88, 91 (C.C.P.A. 1971). For long-felt need and failure of others as evidence of nonobviousness, *see, e.g., In re Tiffin*, 443 F.2d at 400, 170 U.S.P.Q. at 93-94; *see also Dow Chem. Co. v. American Cyanamid Co.*, 816 F.2d 617, 623, 2 U.S.P.Q.2d 1350, 1355 (Fed. Cir. 1987); *Rosemount, Inc v. Beckman Instruments, Inc.*, 727 F.2d 1540, 1546, 221 U.S.P.Q. 1, 7 (Fed. Cir. 1984). For copying as evidence of nonobviousness, *see, e.g., Rosemount*, 727 F.2d at 1546, 221 U.S.P.Q. at 7.

the introduction of the MicroMount stencil in about 1989.<sup>12</sup> As is further explained in the Declaration, however, each of the attempts met with only limited success, as commercial sales of frameless stencils remained small.<sup>13</sup> The MicroMount stencil (upon which GB 2,264,460 reads) was the industry leader among frameless stencils from its introduction until the introduction of the TETRA stencil nine years later; the MicroMount stencil generally accounted for about 20% of the frameless-stencil market, as estimated in the Declaration.<sup>14</sup>

Notwithstanding that the MicroMount stencil and various other types of frameless and mesh-and-frame stencils were on the market over the course of the approximately nine years from the introduction of the MicroMount until the introduction of the TETRA stencil, thereby offering evidence of a long-felt need in the PCB fabrication industry for a frameless stencil, there is no evidence of anyone else ever having pieced together various elements of different stencil designs from the prior art to produce a highly successful frameless stencil (at least in terms of sales figures), much less to produce the particular frameless stencil described in the amended claims. This long-felt need in the industry for a frameless stencil and the substantial failure by others to satisfy this need offer strong evidence that the earlier existence of framed stencils, such as that disclosed in Rasmussen, and of frameless stencils, such as that disclosed in GB 2,264,460 (*e.g.*, the MicroMount stencil), and knowledge thereof throughout the industry did not render obvious the metal stencil described in the amended claims (having the apertures along four edges), the success of which (as embodied in the TETRA stencil) far surpassed that of the earlier frameless stencils.<sup>15</sup> The inventiveness of this design over the prior art is further bolstered by industry-wide copying of the design, wherein metal stencils were provided with apertures along four edges, after the TETRA stencil was introduced to the market.<sup>16</sup>

In view of this evidence that it was non-obvious to those of skill in the art to modify the MicroMount stencil (or, more generically, the teachings of GB 2,264,460) to provide apertures along four edges of the stencil and absent any suggestion or motivation in the cited references to

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<sup>12</sup> Declaration of V. Van Velthoven, ¶¶ 7 and 8.

<sup>13</sup> *Id.*

<sup>14</sup> Declaration, ¶¶ 4 and 8.

<sup>15</sup> *See* Declaration, ¶ 11.

<sup>16</sup> Declaration, ¶ 11.

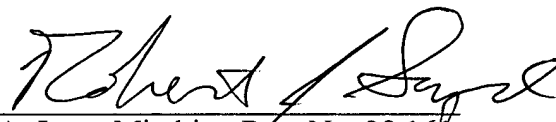
APPLICANTS: David Godfrey Williams  
U.S.S.N.: 09/586,824

combine their teachings to produce such a stencil, Applicant respectfully submits that all of the amended claims are non-obvious.

### CONCLUSION

In view of the amendments and remarks presented herein, Applicant respectfully requests that a timely notice of Allowance be issued in this case. If there are any questions regarding these amendments and remarks, the Examiner is encouraged to contact the undersigned at the telephone number provided below.

Respectfully submitted,



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